Cryptosporidiosis

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Cryptosporidium parvum, a coccidian protozoan, is the species associated with human infection. It was not recognized as a cause of human illness until 1976.

B. Clinical Description

The most common symptom of cryptosporidiosis is profuse and watery diarrhea. Other signs and symptoms include weight loss, stomach cramps, nausea, vomiting, and low-grade fever. Symptoms often wax and wane, but remit in fewer than 30 days in most immunocompetent people. Immunodeficiency, especially in HIV infection, is associated with an inability to clear the parasite, and the disease may have a prolonged and fulminant clinical course, contributing to death. Asymptomatic infections are common and serve as a source of infection for others. Diagnosis is generally made by the identification of oocysts in fecal smears. Organisms can also be identified in intestinal biopsy tissue. In addition, new and more sensitive ELISA tests have recently become available.

C. Reservoirs

Humans, cattle and other domestic animals are reservoirs.

D. Modes of Transmission

Infected animals and people excrete large numbers of oocysts in stool. The infectious dose is not certain, but is probably very low. Oocysts are relatively hardy and can survive in the environment for weeks or months. They are resistant to concentrations of chlorine and other disinfectants commonly used for drinking water treatment. They can be killed by heat or removed by adequate filtration. The most common mode of transmission is person-to-person. Persons become infected by hand-to-mouth transfer of oocysts from the feces of an infected individual, especially in institutions and daycare centers. Transmission can also occur person-to-person through certain types of sexual contact (*e.g.*, oral-anal contact). Large outbreaks traced to contaminated drinking water have been reported, including an outbreak in Milwaukee that reportedly affected 400,000 people. Localized outbreaks may occur from fecally contaminated water, such as stream/lake waters and swimming pools that are open to contamination by human and animal feces. Outbreaks have also occurred from eating food contaminated by animal feces (*e.g.*, unpasteurized apple cider). An infected food worker could also be a source for foodborne transmission. In addition, zoonotic transmission can occur through contact with feces from infected animals (for livestock handlers, dairy farmers, veterinarians, etc.).

E. Incubation Period

The incubation period is not precisely known; 1 to 12 days is the likely range, with an average of about 7 days.

F. Period of Communicability or Infectious Period

The disease is communicable for as long as the infected person excretes *Cryptosporidium* oocysts, which generally begins at the onset of symptoms. Oocysts continue to be excreted in the stool for several weeks after symptoms subside, and they may remain infective outside the body for two to six months in a moist environment.

G. Epidemiology

Cryptosporidiosis has a worldwide distribution. In developed countries, the prevalence of infection ranged from < 1% to 4.5% of individuals surveyed by stool examination. The prevalence is significantly higher in developing regions of the world. Cryptosporidiosis is among the most common causes of persistent diarrhea in patients with AIDS in the United States. Children under two years of age, animal handlers, travelers to endemic areas, men who have sex with men, and close contacts of infected individuals are those most likely to be infected. Outbreaks have been reported in daycare centers and have been associated with public drinking water; swimming in contaminated pools, lakes and ponds; and drinking unpasteurized cider made from apples contaminated with cow manure. It is estimated that 50% of dairy calves shed oocysts and that the parasite is present on >90% of dairy farms.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

Report a case that meets any of the following criteria:

- Demonstration of *C. parvum* cysts in stool; or
- Demonstration of *C. parvum* cysts in intestinal fluid or small-bowel biopsy specimens; or
- Demonstration of *C. parvum* antigen in stool by a specific immunodiagnostic test (*e.g.*, enzyme-linked immunosorbent assay or "ELISA").

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute does not provide ova and parasite testing of clinical samples or food specimens.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify whether the case may be a source of infection for other persons (*e.g.*, a diapered child, daycare attendee or foodhandler) and if so, to prevent further transmission.
- To identify transmission sources of public health concern (*e.g.*, a contaminated public water supply) and to stop transmission from such a source.

B. Laboratory and Healthcare Provider Reporting Requirements

Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for specific information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report the occurrence of any case of cryptosporidiosis, as defined by the reporting criteria in Section 2) A above. Current requirements are that cases be reported to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official MDPH *Bacteria and Parasitic Gastroenteritis Case Report Form* (located in Appendix A). Please refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**
   a. It is the LBOH responsibility to complete a *Bacterial and Parasitic Gastroenteritis Case Report Form* (in Appendix A) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.

   b. Use the following guidelines to assist you in completing the form:
      1) Accurately record the demographic information, date of symptom onset, symptoms, and medical information.
      2) When asking about exposure history (food, travel, activities, etc.), use the incubation period range for cryptosporidiosis (1–12 days). Specifically, focus on the period beginning a minimum of 1 day prior to the case's onset date back to no more than 12 days before onset.
      3) If possible, record any restaurants at which the case ate, including food item(s) and date consumed. If you suspect that the case became infected through food, use of the MDPH *Foodborne Illness Complaint Worksheet* (located in Appendix A) will facilitate recording additional information. It is requested that LBOHs fax or mail this worksheet to the MDPH Division of Food and Drugs (see top of worksheet for fax number and address). This information is entered into a database to help link other complaints from neighboring towns, thus helping to identify foodborne illness outbreaks. *This worksheet does not replace the Bacteria and Parasitic Gastroenteritis Case Report Form*.
      4) Ask questions about travel history and outdoor activities to help identify where the case became infected.
      5) Ask questions about water supply and exposure because cryptosporidiosis may be acquired through water consumption.
      6) Household/close contact, pet or other animal contact, daycare, and foodhandler questions are designed to examine the case's risk of having acquired the infection from, or potential for transmitting it to, these contacts. Determine whether the case attends or works at a daycare facility and/or is a food handler.
      7) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the case report form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

   c. After completing the case report form, attach lab report(s) and mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:

      MDPH, Division of Epidemiology and Immunization
      Surveillance Program, Room 241
      305 South Street
      Jamaica Plain, MA 02130

   d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

Foodhandlers with cryptosporidiosis must be excluded from work. *Note:* A case of cryptosporidiosis is defined by the reporting criteria in Section 2) A of this chapter.

Minimum Period of Isolation of Patient
After diarrhea has resolved, foodhandling facility employees may only return to work after producing one negative stool specimen. In outbreak circumstances, a second consecutive negative stool specimen will be required prior to returning to work.

Minimum Period of Quarantine of Contacts
Contacts with diarrhea who are foodhandling facility employees shall be considered the same as a case and handled in the same fashion. No restrictions otherwise.

Note: A foodhandler is any person directly preparing or handling food. This can include a patient care or child care provider. See glossary for a more complete definition.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Daycare
Since cryptosproidiosis may be transmitted person-to-person through fecal-oral transmission, it is important to follow up on cases of cryptosporidiosis in a daycare setting carefully. The MDPH *Health and Safety in Child Care* provides detailed information on case follow-up and control in a daycare setting. General recommendations include:

- Children with *Cryptosporidium* who have diarrhea should be excluded until their diarrhea is resolved.
- Children with *Cryptosporidium* who have no diarrhea and are not otherwise ill may be excluded or remain in the program if special precautions are taken.
- Since most staff in child care programs are foodhandlers, those with *Cryptosporidium* in their stools (symptomatic or not) can remain on site, but must not prepare food or feed children until their diarrhea has resolved and they have one negative stool specimen. (Per *105 CMR 300.200*)
- Refer to Chapter 17 of the MDPH *Health and Safety in Child Care Manual* for complete guidelines on handling diseases spread through the intestinal tract.

School
Since cryptosporidiosis may be transmitted person-to-person through fecal-oral transmission, it is important to follow up on cases of cryptosporidiosis in a school setting carefully. The MDPH *Comprehensive School Health Manual* provides detailed information on case follow-up and control in a school setting. General recommendations include:

- Students or staff with *Cryptosporidium* who have diarrhea should be excluded until their diarrhea is gone.
- Students or staff with *Cryptosporidium* who do not handle food, have no diarrhea or have mild diarrhea and are not otherwise sick, may remain in school if special precautions are taken.
- Students or staff who handle food and have *Cryptosporidium* infection (symptomatic or not) must not prepare food until their diarrhea is gone and they have one negative stool test. (Per *105 CMR 300.200*)
- Refer to Chapter 8 of the MDPH *Comprehensive School Health Manual* for complete guidelines in handing diseases spread through the intestinal tract.

Community Residential Programs
Actions taken in response to a case of cryptosporidiosis in community residential programs will depend on the type of program and the level of functioning of the residents.

In long-term care facilities, residents with cryptosporidiosis should be placed on standard (including enteric) precautions until symptoms subside *and* they have a negative stool test for *Cryptosporidium.* (See the Division of Epidemiology and Immunization's *Control Guidelines for Long-Term Care Facilities* for further actions. A copy can be obtained by calling the Division at (617) 983-6800.) Staff members who give direct patient care (*e.g.,* feed patients, give mouth or denture care, give medications) are considered foodhandlers and are subject to foodhandler restrictions under *105 CMR 300.200*. (See Section 4A above.) In addition, staff members with *Cryptosporidium* infection who are not considered foodhandlers should not work until their diarrhea is gone.

In residential facilities for the developmentally disabled, staff and clients with cryptosporidiosis must refrain from handling or preparing food for other residents until their diarrhea has subsided and they have one negative stool test for *Cryptosporidium* (per *105 CMR 300.200*). In addition, staff members with cryptosporidiosis who are not foodhandlers should not work until their diarrhea is gone.

Reported Incidence Is Higher than Usual/Outbreak Suspected
If the number of reported cases of cryptosporidiosis in your city/town is higher than usual, or if you suspect an outbreak, investigate to determine the source of infection and mode of transmission. A common vehicle (such as water or food, or association with a daycare center) should be determined and applicable preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal hygiene and sanitary disposal of feces. Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several town lines and therefore be difficult to identify at a local level.

Note: Refer to the MDPH's *Foodborne Illness Investigation and Control Reference Manual* for comprehensive information on investigating foodborne illness complaints and outbreaks. (Copies of this manual were distributed to local boards of health in 1997–98. It can also be located on the MDPH website in PDF format at <http://www.magnet.state.ma.us/dph/fpp/refman.htm>.) For recent changes (fall of 2000) to the Massachusetts Food Code, contact the Division of Food and Drugs, Food Protection Program at (617) 983-6712 or through the MDPH website at <http://www.state.ma.us/dph/fpp/>.

D. Preventive Measures

Personal Preventive Measures/Education
To avoid exposure, recommend that individuals:

- Always wash their hands thoroughly with soap and water before handling food or eating, after using the toilet or changing diapers, and after contact with animals, especially cattle.
- After changing diapers, wash the child's hands as well as their own.
- Avoid drinking raw milk, other unpasteurized dairy products, or unpasteurized apple cider.
- Dispose of feces in a sanitary manner, especially in daycare centers or other institutional settings.
- Avoid drinking water from streams or lakes. Avoid drinking unboiled water while traveling in developing countries or whenever else the water quality is unknown. (Bringing water to a full, rolling boil is sufficient to kill *Cryptosporidium).*
- Adhere to local advisories to boil water.

The likelihood that *Cryptosoridium* could cause illness in regulated, public drinking water is low. Immunocompromised individuals, however, may want to consider the following recommendations:

- Avoid fecal contact.

- Avoid sexual practices that may involve direct contact with feces. Latex barrier protection should be emphasized as a way to prevent the spread of cryptosporidium to case's sexual partners as well as being a way to prevent the exposure to and transmission of other pathogens.
- Boil tap water before drinking or making ice cubes.
- Consider the use of a home water filtering system with a very fine filter (absolute pore size of 1 micron or smaller). Such filters include: reverse-osmosis filters; filters labeled as "absolute" 1 micron filters; and those labeled as meeting National Sanitation Foundation (NSF) standard #53 for cyst removal.
- Avoiding swallowing water when swimming. Lakes, streams (and other surface waters) and swimming pools may be contaminated with *Cryptosporidium* and chlorination is not effective in eliminating the parasite.

A *Cryptosporidiosis Public Health Fact Sheet* can be obtained from the Division of Epidemiology and Immunization or through the MDPH website at <http://www.state.ma.us/dph/>. Click on the "Publications" link and scroll down to the Fact Sheets section. It is also available in Spanish.

ADDITIONAL INFORMATION

The formal Centers for Disease Control and Prevention (CDC) surveillance case definition for cryptosporidiosis is the same as the criteria outlined in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) When reporting a case to the MDPH, always refer to reporting criteria in Section 2) A.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases, 24th Edition.* Illinois, Academy of Pediatrics, 1997.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. May 2, 1997; 46:RR-10.

CDC Website. Crypotsporidiosis. Available at <www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_cryptosporidiosis.htm>. Updated August 15, 1999.

Chin, J., ed. *Control of Communicable Diseases Manual, 17th Edition.* Washington, DC, American Public Health Association, 2000.

MDPH. *The Comprehensive School Health Manual*. MDPH, January 1995.

MDPH. *Health & Safety in Child Care: A Guide for Child Care Providers in Massachusetts*. MDPH, 1995

MDPH. *Regulation 105 CMR 300.000: Reportable Diseases and Isolation and Quarantine Requirements*. MDPH, Promulgated November 1998 (Printed July 1999).

Oregon Health Department. *Investigative Guidelines: Cryptosporidiosis*. Oregon Health Division, June 1994.